



Low Cost Guidance Electronics Unit (LCGEU)

April 30, 2002

46th Annual NDIA Fuze Conference



- ❑ Background
- ❑ Program Plan
- ❑ Team Composition
- ❑ Concept – Operational
- ❑ Concept – Mechanical
- ❑ Deeply Integrated GPS – General
- ❑ DI GPS – Enabling Low Cost Solution
- ❑ Test Plan

- ❑ BAA evolved to address key need:
 - “The Government is seeking clever ideas for Alternative Guidance Electronic units that will provide the best balance between performance and cost.”
 - Focus on low cost
- ❑ Potential line item replacement for the existing ERGM GEU.
- ❑ Target costs of \$7k in FY04 dollars, based on 2000 units.

Program Plan



- ❑ Currently in demonstration phase:
 - Demonstrate gun shock survivability.
 - Demonstrate Deep Integration with direct-Y receiver.
 - Demonstrate antijam (AJ) performance of system.
 - Demonstrate the low-cost solution is viable.



Team Composition



- ❑ NAVSEA – PMS 529: Program Management
- ❑ NSWC Dahlgren: TDA
- ❑ Charles Stark Draper Labs: Prime Contractor
 - Rockwell Collins – GPS Receiver
 - ANC – GPS Antijam
 - MicroPulse – GPS Antennae
- ❑ Raytheon: Airframe Support



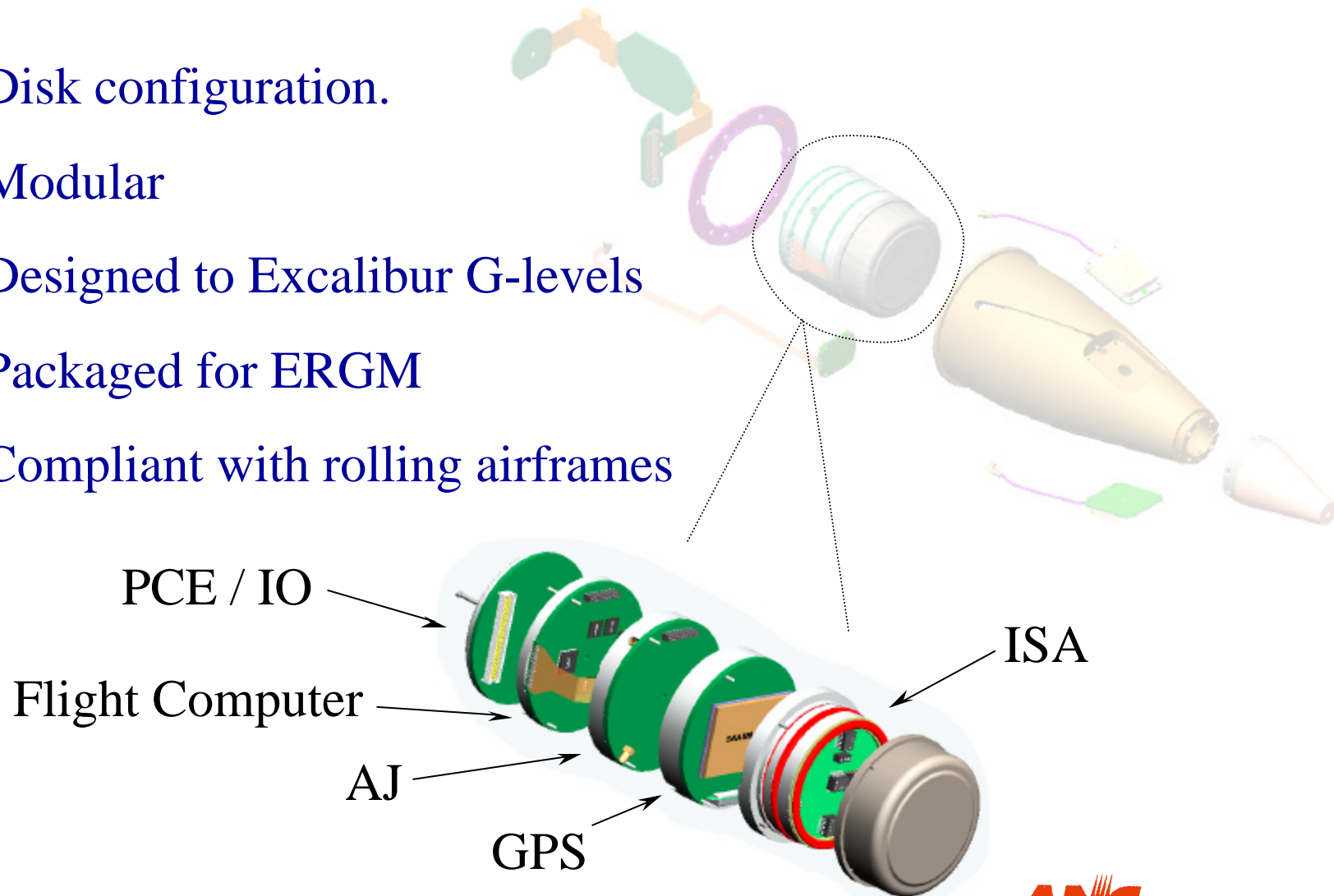
Concept - Operational

- ❑ Gun launch
 - 10 to 20 k-Gs
 - Airframe dependent
- ❑ Ballistic flight through rocket motor burn
- ❑ Down determination
- ❑ Canard deployment / roll stabilization
- ❑ GPS acquisition
- ❑ DI GPS / INS GNC
- ❑ Inertial GNC in endgame under jamming



Concept - Mechanical

- ❑ Disk configuration.
- ❑ Modular
- ❑ Designed to Excalibur G-levels
- ❑ Packaged for ERGM
- ❑ Compliant with rolling airframes



Concept – Mechanical, cont'd.

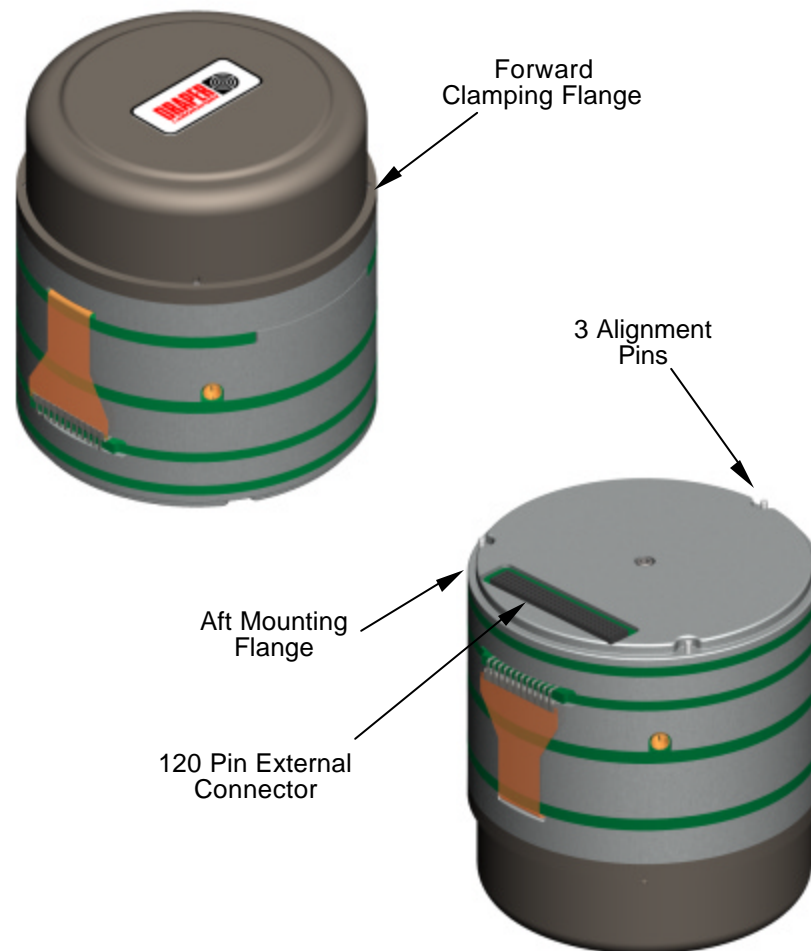
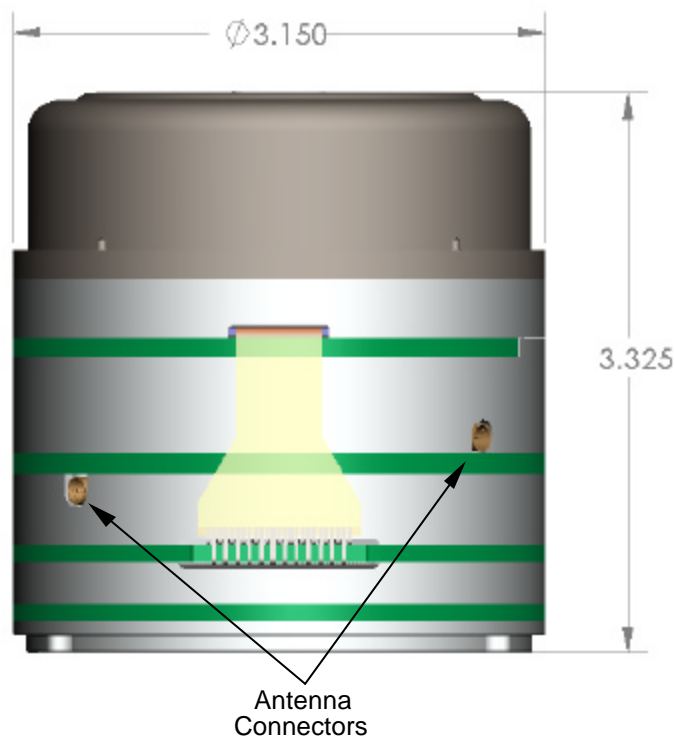


Stats

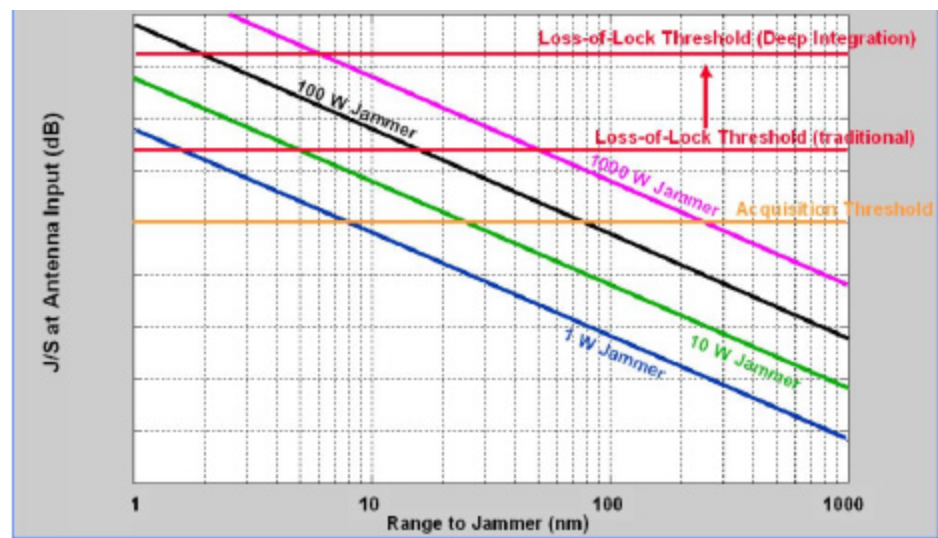
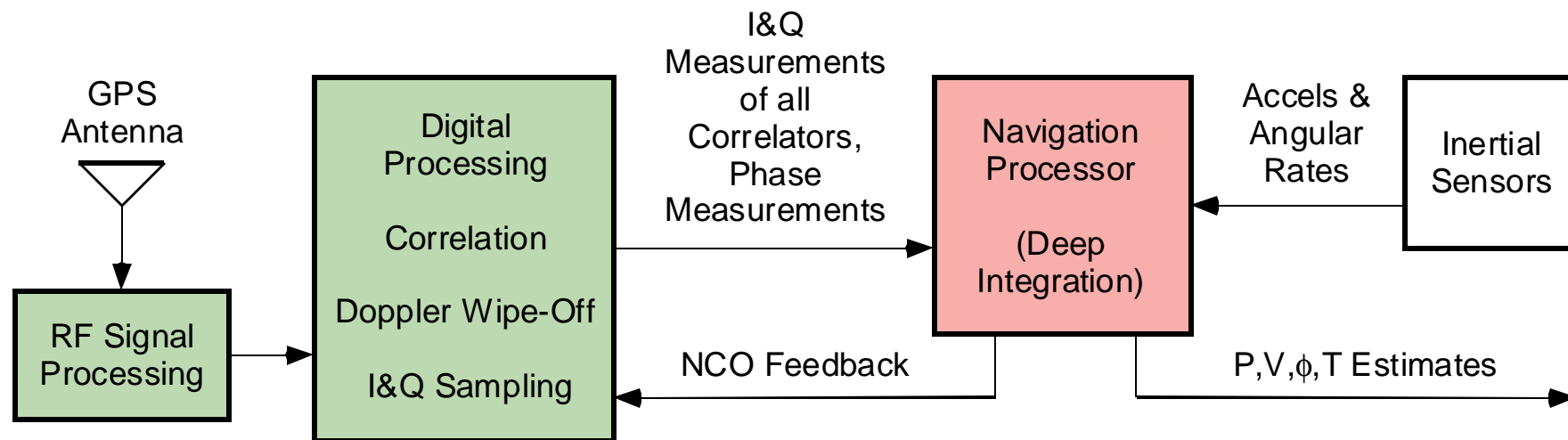
Volume: 25 in³

Weight: 1.5 lbs.

Power: 13.8 Watts



Deeply Integrated GPS - General



} $\Rightarrow 20$ dB

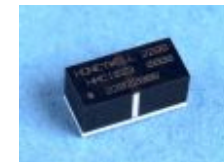
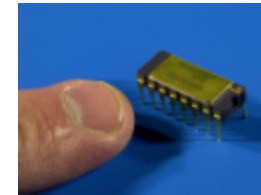
DI GPS – Enabling Low Cost Solution



- ❑ ISA module comprised of automotive quality MEMS-type sensors:

- Analog Devices gyros
- AD Accelerometers
- Honeywell Magnetometer

Low Cost COTS
Sensors



- ❑ 3-Tier approach to ensure maintenance of GPS track and lock late into endgame:

- Direct-Y acquisition
- AJ RF frontend
- Deep Integration

Late endgame inertial
still maintains system
accuracy.

- ❑ Railgun testing of all subsystems completed Spring 02.
- ❑ Canister gun testing at NSWCDD Summer 02.
- ❑ Flight testing:
 - First gun launch on ERGM A/F Fall 02.
 - Gun testing on ERGM A/Fs completed Spring 03.
 - Additional flight testing possible:
 - ❑ Excalibur – ARDEC
 - ❑ Rolling airframes - NSWCDD